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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/981,402 | 10/17/2001 | Yoshihiro Satoh | N32040200W | 6789 |

7590 10/19/2005

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| EXAMINER |
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RICHARDS, N DREW

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| ART UNIT | PAPER NUMBER |
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2815

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/981,402

Applicant(s)

SATO, YOSHIHIRO

Examiner

N. Drew Richards

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2 and 7-20 is/are pending in the application.
- 4a) Of the above claim(s) 7-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 recites the limitation "the electrical connection" in line 13. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liaw (U.S. Patent No. 5,807,779) in view of Applicants admitted prior art.

Liaw teach a semiconductor device structure on a silicon substrate 1 in figure 7, comprising:

- a contact 15 which penetrates an interlayer insulating film 11 and is connected with a diffusion layer (unlabeled diffusion layer formed immediately to the left or right of FOX 2) in the silicon substrate 1;

- a gate electrode 4 which is formed on the silicon substrate 1 and contains a silicon nitride film at upper and side portions (nitride 5 at the upper portions and nitride 7 at the side portions); and
- a silicon nitride film 9 for preventing carbon diffusion (preventing carbon diffusion is an intended use of the layer, in this case the silicon nitride film 9 is capable of preventing carbon diffusion and thus reads on the film as claimed), having a portion sandwiched between the interlayer insulating film 11 and the silicon substrate 1 and adjacent to the gate electrode 4 in a direction essentially parallel to a substrate surface, such a sandwiched portion having a thickness in a direction perpendicular to the substrate surface that is less than a thickness of the gate electrode 4 in the perpendicular direction (as seen, layer 9 is thinner than gate 4), the silicon nitride film traversing a region except a portion for providing the electrical connection between the contact 15 and the diffusion layer (silicon nitride film 9 traverses the entire cross section except for the portion where contact 15 connects to the substrate, this portion is the "electrical connection" between the contact 15 and the diffusion region since the contact 15 and the diffusion region are electrically connected through region 8 and the channel of the transistor) and is formed on the nitride film at the upper and side portions of the gate electrode 4 wherein the silicon nitride film 9 for preventing carbon diffusion includes a portion having a bottom surface in contact with and extending parallel to the diffusion layer away from the gate electrode and a top surface in contact with the interlayer insulating film 11.

Liaw does not teach an insulating film formed from a gas containing carbon.

Applicants admitted prior art teaches in figures 16 and 17 and on pages 1-3 a semiconductor device structure that includes a contact 30 which penetrates an interlayer insulating film 25, a gate electrode 16/18 which has a silicon nitride film at upper 20 and side 24 portions, and an insulating film formed from a gas containing carbon (not shown). Applicants admitted prior art teaches forming a capacitor over and connected to the contact 30, though does not show the capacitor. Applicants admitted prior art teach using tantalum pentoxide as the capacitor dielectric. Tantalum pentoxide is an insulating film that is known to be formed from a gas containing carbon.

Applicants admitted prior art teach forming the capacitor over the transistor to form a DRMA which allows storage of information and is commonly used as a memory.

Applicants admitted prior art teach using a high dielectric constant capacitor dielectric such as tantalum pentoxide to keep satisfactory capacitance with reduced device size.

Liaw and Applicant admitted prior art are from the same field of endeavor. At the time of the invention it would have been obvious to form a capacitor with the high dielectric constant capacitor dielectric in the device of Laiw. The motivation for doing so is to provide memory operation for the storage of data and using the high dielectric constant capacitor dielectric allows for smaller device sizes (and thus higher integration) having satisfactory capacitance. Thus, it would have been obvious to combine Liaw with Applicants admitted prior art to obtain the invention of claim 1.

With regard to claim 2, as taught by Applicants admitted prior art, the insulating film includes tantalum oxide and the device is a dynamic random access memory having a memory cell capacitor including the tantalum oxide.

Response to Arguments

5. Applicant's arguments filed 7/18/05 have been fully considered but they are not persuasive. Applicant has argued that Liaw does not teach the silicon nitride layer having a bottom surface in contact with the diffusion layer, the diffusion layer being the same diffusion layer connected to the contact. This is not persuasive. Though the diffusion layer beneath the bottom surface of the silicon nitride film is not directly contacted by the contact, it is electrically connected to the contact. All of the diffusion regions shown in Liaw figure 7 are electrically connected to the contact, be it a direct physical and electrical connection or an indirect electrical connection through the channel region of the transistors. The claim language does not preclude the contact being "connected" though various intermediate structures and thus Liaw does teach the limitations as claimed.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on Monday-Friday 9:00-5:00.

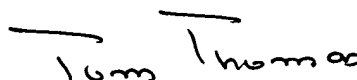
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



NDR



TOM THOMAS
SUPERVISORY PATENT EXAMINER